# THE EFFICIENCY ENHANCEMENT OF WAREHOUSE SPACE MANAGEMENT WITH ABC ANALYSIS: A CASE STUDY OF ABC COMPANY LIMITED

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## ABSTRACT

The research on the efficiency enhancement of warehouse space management with ABC analysis: a case study of ABC Company limited aims to study the increase of warehouse efficiency and to improve work processes in the warehouse system of ABC company limited with ABC Analysis from the observation and collecting data on the company's warehouse management process. Why-Why Analysis and Fishbone Diagram were used to find the causes and ways to increase the efficiency of moving goods within the warehouse with the ABC Analysis theory. It was found that the picking of goods was delayed due to 4 reasons: inadequate equipment, the staff who lack expertise in the operation, the process that still lacks the pattern in each step of the operation, and a variety of products. The company has technology but it cannot be used to identify location, therefore the problem of old products and new products mixed together, making management difficult. When analyzing ABC for product classification, it can improve the storage process within the warehouse more efficiently. The researchers measured 3 dimensions of logistics performance: cost dimension, time dimension, and reliability dimension. After increasing the warehouse efficiency, it found that the original cost of 64,000 baht can be reduced to 40,000.312 baht per month. At the same time, the time of 1 hour and 30 minutes per cycle can be reduced to 1 hour per cycle. For the reliability, it found that employees within the warehouse originally pick up the product according to the target of 95 percent. After improving the location form and product placement, they pick up the product according to the target set, increasing to 98 percent.

**Keywords:** Space Management, Warehouse, ABC Analysis

## INTRODUCTION

Effective and efficient logistics management makes the competitive advantage which is to be above business competitors in terms of quality, lower cost, differences, speed, punctuality of service, and, most importantly, cheap products and services. This generates customer satisfaction and loyalty for future purchases by creating flexibility within the organization [1]. Effective logistics management is important to the company in two ways: increasing revenue in terms of sales and reducing production costs or services with the efficient management of storage and product flow by arising from the alternatives among the activities in the logistics system. Selecting a group of logistics activities that can reduce the total cost of using the organizational resources superlatively must be implemented with planning and proper or effective management, saving or reducing costs. The short work time can causes customer satisfaction because it can satisfy customers' requirement. That is to say, logistics makes the accuracy of products and services in amount, quality, time, location, and price. Therefore, logistics can create utilities in terms of location, time, and customer satisfaction. It can create loyalty in the product and a good corporate image. It, finally, causes the increase of the revenue from the sales [2]. At present, the warehouse is an important part of the supply chain management system of each organization. In general, the warehouse serves to store products in various points of the shipping process.

Inventory is an important thing that should be paid close attention to. Problems that occur in counting and stock inaccuracy affect the production. The actual inventory not corresponding to the system causes the stock out or product less than the specified minimum stock and also causes the excess product or product over specified maximum stock, making insufficient storage space. It is one of the reasons that affect the business. The business that has insufficient products to sell to customers will negatively result for business. While, the product exceeds the needs of customers, causing the company has to bear more cost of inventory and its customers lose confidence which causes the business to not be able to operate with customers. The inventory system management therefore plays an important role in satisfying customers. Warehouse management is a support activity that makes receiving goods, product distribution, and delivery efficient due to saving time and expenses in operations, such as inventory control, determining product storage location to be able to pick up correctly and quickly, and making First In First Out (FIFO) system, etc. This results in efficient inventory management system.

ABC Co., Ltd. provides warehouse services to companies that need to deliver the products in the country and abroad. Most products are car accessories which are imported from overseas. There are some parts produced

in Thailand. Most products are Fast Moving products. Products will come in just a few days or come in and send out immediately. Therefore it found some defects in some processes. Consequently, the company delays to response to the needs of the customers. The researchers realized the importance of managing this process to be more effective. Thus, the research on the efficiency enhancement of warehouse space management with ABC analysis: a case study of ABC company limited was conducted so that the company can compete with other entrepreneurs efficiently and sustainably.

## OBJECTIVE

1. To study the working process within the warehouse, a case study of ABC Co., ltd.
2. To enhance the efficiency of the warehouse space allocation, a case study of ABC Co., ltd.

## METHODOLOGY

***Warehouse Efficiency Enhancement Concept***

Warehouse management means organizing the movement of goods, storage of goods, arrangement of goods, and systematic maintenance of goods to sustain the goods in good condition by using low operating costs to assist in operations and make a profit for the business. This operation is arisen from the management of all resources within the warehouse effectively [3].

The importance of logistics management in the warehouse to enhance competitiveness by maintaining existing customer base and increasing customer base is the cost reduction, delivering products in perfect condition, delivering products on time, and customer service. When the customers are satisfied, they return to buy the products. Logistics management has to be considered in other areas [4] as follows

1. Warehouse management policy is important to business organizations. It is a practice guideline that executives will set up. It express about the mission and responsibilities of each department for the same standard for the whole company. Consequently, the follower must achieve the objectives or goals set by the executives in the direction that is specified correctly according to the principles and vision of the executives.

2. In determining the location of the factory or company the link to the production process must be considered. It includes the source of raw materials used in the production process, the source of the market, the rules of the factory site, and the availability of utilities. These things directly affect the cost of goods. It also impacts the overall efficiency of operations in the logistics system of the factory.

3. The executives must have operational plan. It includes raw material planning, production capacity planning, and planning to move raw materials to the warehouse and to the customers.

4. Planning material movement during production and factory layout need to be operated concurrently. The principles of management must be consistent with the logistics management concepts that focus on time and place management in the movement of materials in the production process.

***Principles of Goods Movement in Warehouse***

1. Orientation Principle. It is the study on the relationship of the system from the plan being used in order to be able to know management methods, existing problems, and physical and economic limitations so that entrepreneurs can determine future needs and goals.

2. Planning Principle. It is the plan including basic requirements, preferred options, and considering the possibility of caring for the material, and the product storage.

3. Systems Principle. It is the bringing the care and storage activities into the system. The possibility in economics aspects is focused. This includes the tasks of receiving, inspecting, storing, producing, assembling, packaging, warehousing, shipping, and transportation.

4. Unit Load Principle. It is the product management as large unit as possible.

5. Space Utilization Principle. It is the space management for the most benefit.

6. Standardization Principle. It is the Standardization of methods of handling products and equipment wherever possible.

7. Ergonomic Principle. It is the recognition of ability and limitation of human anatomy in order to be able to design the equipment and product care process In order to achieve the most efficient usage between users and systems.

8. Energy Principle. It is the gathering information on energy consumption of the material handling system and process continuously when comparing or preparing improvements for the most cost-effective benefits.

9. Ecology Principle. It is the minimization of adverse effects on the environment when selecting material handling equipment and procedures.

10. Mechanization Principle. It is the bringing the machinery into consideration whether it is efficiency and worth the money spent or not.

***Why-Why Analysis***

Why-Why Analysis or 5 Whys is an iterative interrogative technique used to explore the cause-and-effect relationships underlying a problem. The primary goal of the technique is to determine the root cause of a defect or problem by repeating the question "Why?". Each answer forms the basis of the next question. The "5" in the name derives from an anecdotal observation on the number of iterations needed to resolve the problem. Not all problems have a single root cause. If one wishes to uncover multiple root causes, the method must be repeated asking a different sequence of questions each time.

The method provides no hard and fast rules about what lines of questions to explore, or how long to continue the search for additional root causes. Thus, even when the method is closely followed, the outcome still depends upon the knowledge and persistence of the people involved [5].

***Cause and Effect Diagram***

A fishbone diagram, also called a cause and effect diagram or Ishikawa diagram, is a visualization tool for categorizing the potential causes of a problem in order to identify its root causes. A fishbone diagram is useful in brainstorming sessions to focus conversation. After the group has brainstormed all the possible causes for a problem, the facilitator helps the group to rate the potential causes according to their level of importance and diagram a hierarchy. The design of the diagram looks much like a skeleton of a fish. Fishbone diagrams are typically worked right to left, with each large "bone" of the fish branching out to include smaller bones containing more detail [6].

***ABC Analysis***

The ABC analysis suggests that inventories of an organization are not of equal value. Thus, the inventory is grouped into three categories (A, B, and C) in order of their estimated importance. 'A' item are very important for an organization. Because of the high value of these 'A' items, frequent value analysis is required. In addition to that, an organization needs to choose an appropriate order pattern (e.g. 'just-in-time') to avoid excess capacity. 'B' items are important, but of course less important than 'A' items and more important than 'C' items. Therefore, 'B' items are intergroup items. 'C' items are marginally important [7].

There is no fixed threshold for each class, different proportion can be applied based on objective and criteria. ABC Analysis is similar to the Pareto principle in that the 'A' items will typically account for a large proportion of the overall value but a small percentage of the number of items. ABC class are

'A' items – 20% of the item accounts for 70% of the annual consumption value of the items

'B' items – 30% of the item accounts for 25% of the annual consumption value of the items

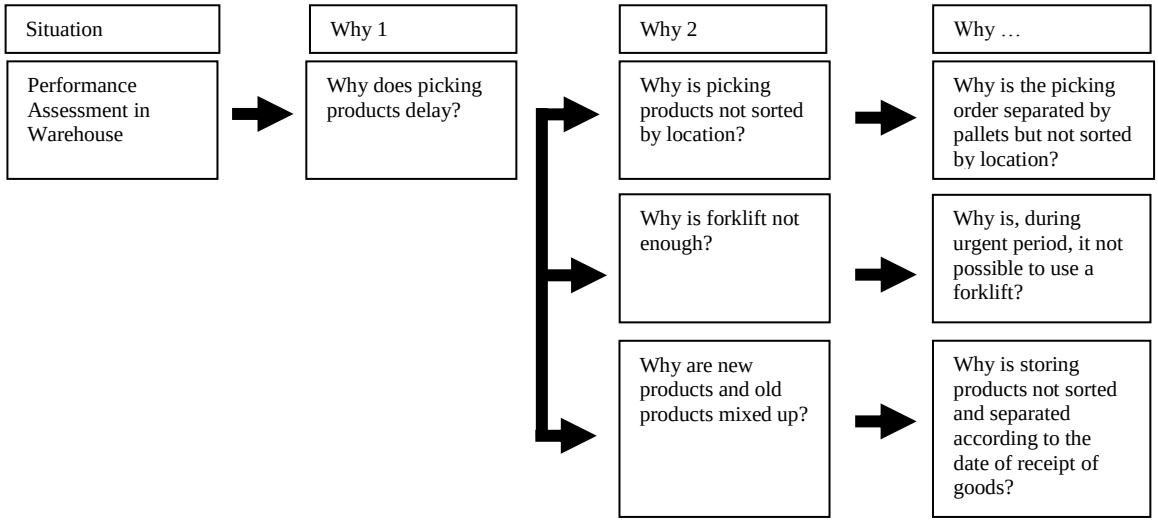
'C' items – 50% of the item accounts for 5% of the annual consumption value of the items

***Step 1 The Study of information***

The researchers studied the internal data of the company by using the Why-Why Analysis theory with the form of the question, as shown in Figure 1 Step 1 can identify the problems that the company will need to improve 3 main causes, including the delay in picking product, picking order not being arranged according to location, and the forklift not enough to work.

**Figure 1**

Analyzing with Why-Why Analysis Theory

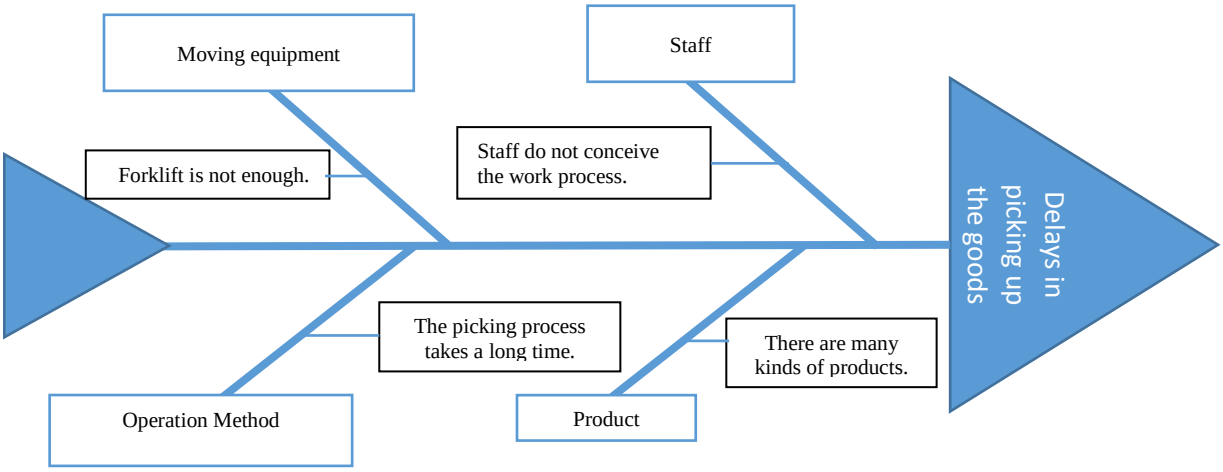



***Step 2 Finding the cause of the problem***

Finding the cause of the problem with Cause and Effect Diagram has analysis form, as shown in Figure 2.

**Figure 2**

Finding the cause of the problem with Cause and Effect Diagram




As shown in Figure 2, on the moving equipment inside the warehouse, there is a hand lift for moving and picking products instead of using an insufficient forklift in order to keep up with the needs of customers. It also found that the staff still lacked warehouse management skills. There is no understanding of the nature of the work that they have been assigned. They, moreover, refuse to improve themselves in the job due to high self-confidence and rarely listen or improve work as the supervisor wants. Therefore, this causes lacking in work efficiency. In addition, there are many types of products in the warehouse. Thus, this causes the delayed and complicated work due to the lack of product storage in order to make it easier to pick up. Finally, the operation method in the picking process takes a long time.

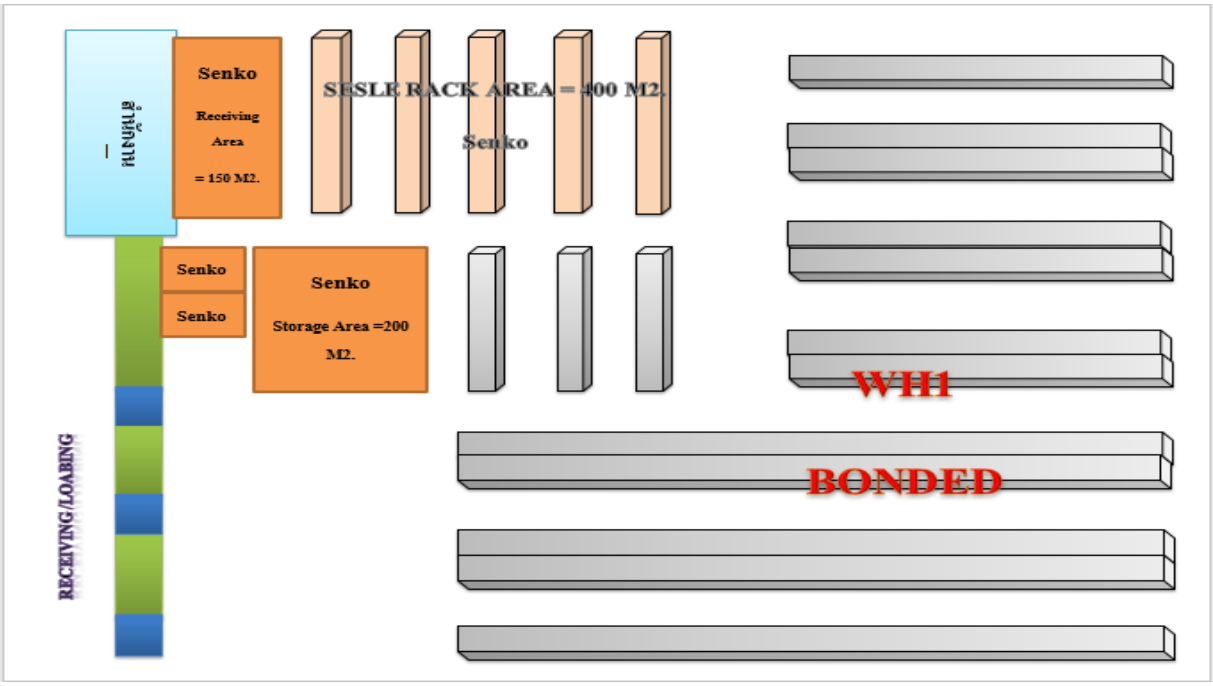
***Step 3 Designing Efficiency Enhancement Guidelines***

Designing efficiency enhancement guidelines aims to solve the problems from internal investigation of the staff work in the warehouse and from inquiring with the theory of Why-Why Analysis and then analyzing it

with Cause and Effect Diagram, therefore the researchers planned to design existing warehouse layout, as shown in Figure 3.

**Figure 3**

Warehouse Layout before Improvement




## RESULTS

The researchers analyzed the location with the type of product classification into categories using the ABC Analysis method and placed the product according to the product picking condition in order to control the picking products efficiency. There is an example of product classification, as shown in Figure 4. After improving with ABC Analysis, then the researchers designed the warehouse layout, as shown in Figure 5.

**Figure 4**

Example of Product Classification in the Form of ABC Analysis

| PART NO. | IN/OUT | Date In/Out | Order date | Inv. IN | Pick IN | Inv. Out | Pick OUT | Request By | Last mile delivery | Lead Time | Result | Criteria Movement |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51006 | IN | 2016-11-01 | | | 3 | 16-2288-TH | | Senko | | | | SLOW-MOVING |
| 51006 | OUT | 2016-11-22 | | OB16/1121001 | | 16-2288-TH | 3 | Senko | YUSEN GENERAL WH | | | SLOW-MOVING |
| 51006 | IN | 2016-12-13 | | | 12 | 16-2376-TH | | Senko | | | | SLOW-MOVING |
| 51006 | OUT | 2016-12-16 | 2016-12-15 | OB16/1215001 | | 16-2376-TH | 12 | Senko | YUSEN GENERAL WH | 1 | | SLOW-MOVING |
| 51036 | IN | 2016-11-01 | | | 48 | 16-2288-TH | | Senko | | | | FAST-MOVING |
| 51036 | IN | 2016-11-15 | | | 63 | 16-2274-TH | | Senko | | | | FAST-MOVING |
| 51036 | OUT | 2016-11-22 | | OB16/1121001 | | 16-2274-TH | 27 | Senko | YUSEN GENERAL WH | | | FAST-MOVING |
| 51036 | OUT | 2016-11-22 | | OB16/1121001 | | 16-2288-TH | 48 | Senko | YUSEN GENERAL WH | | | FAST-MOVING |
| 51036 | OUT | 2016-11-22 | | OB16/1121001 | | 16-2274-TH | 36 | Senko | YUSEN GENERAL WH | | | FAST-MOVING |
| 71779 | IN | 2016-10-03 | | | 352 | 20154775 | | Senko | | | | FAST-MOVING |
| 71779 | IN | 2016-10-03 | | | 11 | 20154775 | | Senko | | | | FAST-MOVING |
| 71779 | OUT | 2016-10-05 | 2016-09-28 | SK16/1003015 | | 20154658 | 12 | Senko | SUMITOMO ELECTRIC | 7 | | FAST-MOVING |
| 71779 | OUT | 2016-10-07 | 2016-10-03 | SK16/1003026 | | 20154775 | 51 | Senko | SUMITOMO ELECTRIC | 4 | | FAST-MOVING |
| 71779 | OUT | 2016-10-13 | 2016-10-06 | SK16/1006003 | | 20154775 | 42 | Senko | SUMITOMO ELECTRIC | 7 | | FAST-MOVING |
| 71779 | OUT | 2016-11-03 | 2016-10-27 | SK16/1101012 | | 20154775 | 32 | Senko | SUMITOMO ELECTRIC | 7 | | FAST-MOVING |
| 71779 | OUT | 2016-11-03 | 2016-10-27 | SK16/1101012 | | 20154775 | 8 | Senko | SUMITOMO ELECTRIC | 7 | | FAST-MOVING |
| 71779 | OUT | 2016-11-03 | 2016-10-27 | SK16/1101012 | | 20154775 | 2 | Senko | SUMITOMO ELECTRIC | 7 | | FAST-MOVING |
| 71779 | OUT | 2016-11-14 | 2016-11-09 | SK16/1107010 | | 20154775 | 21 | Senko | SUMITOMO ELECTRIC | 5 | | FAST-MOVING |
| 71779 | IN | 2016-11-22 | | | 169 | 20154817 | | Senko | | | | FAST-MOVING |
| 71779 | OUT | 2016-11-24 | | SK16/1116014 | | 20154775 | 10 | Senko | SUMITOMO ELECTRIC | | | FAST-MOVING |
| 71779 | OUT | 2016-11-24 | | SK16/1116014 | | 20154775 | 32 | Senko | SUMITOMO ELECTRIC | | | FAST-MOVING |
| 71779 | OUT | 2016-12-01 | 2016-11-24 | SK16/1201002 | | 20154775 | 32 | Senko | SUMITOMO ELECTRIC | 7 | | FAST-MOVING |
| 71779 | OUT | 2016-12-01 | 2016-11-24 | SK16/1201002 | | 20154775 | 9 | Senko | SUMITOMO ELECTRIC | 7 | | FAST-MOVING |
| 71779 | OUT | 2016-12-01 | 2016-11-24 | SK16/1201002 | | 20154775 | 1 | Senko | SUMITOMO ELECTRIC | 7 | | FAST-MOVING |
| 73845 | IN | 2016-11-21 | | | 16 | 307187 | | Senko | | | | SLOW-MOVING |

As shown in Figure 4, the warehouse management by sorting products with the method of inventory classification according to the activity base (ABC Analysis) provided the information that any type of product is a Fast Moving product and then such type of product was sorted according to the priority.

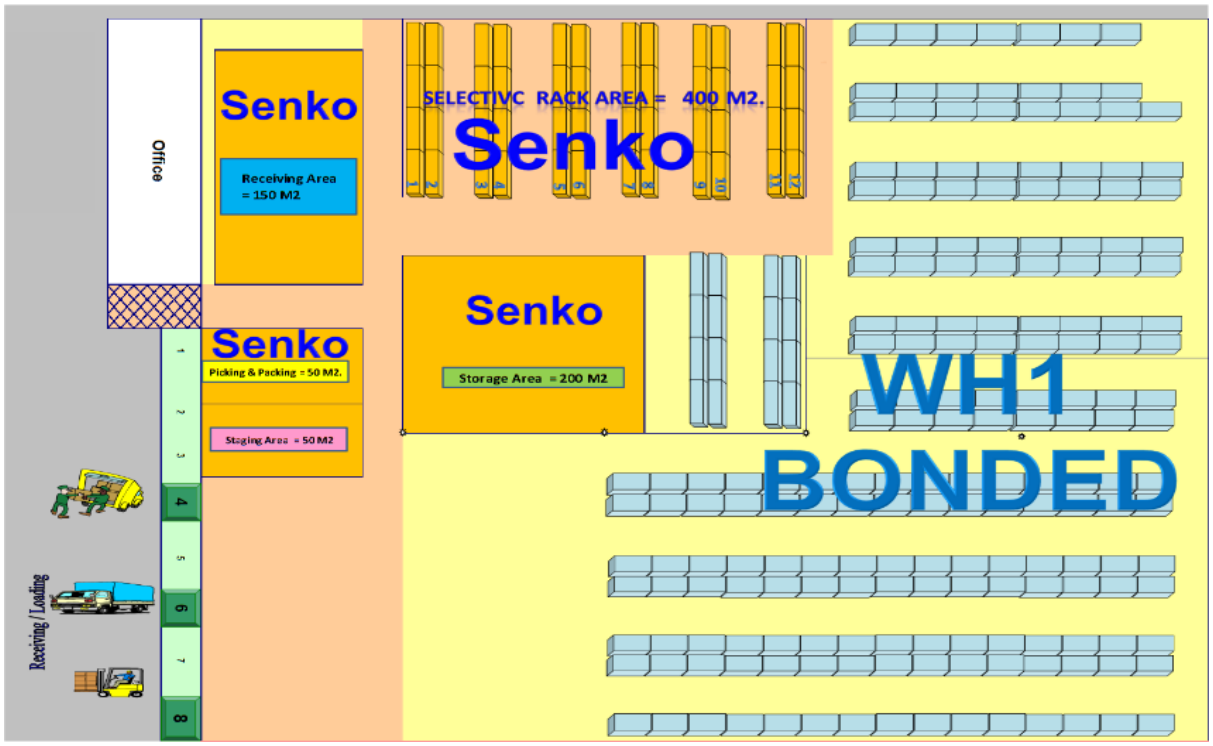
Class A is the products that have fast turnover and provide the company with high business profits. Therefor carefulness and management are very important. As rapid turnover, there is no problem in costs and expenses but products in Class A have is possibly not enough to meet the demand in the market. Therefore, there should always be predictions and forecasts of the demand for the products. If there is a proper management of Class A, it positively affects the turnover rate of inventory as well. Because the product cost is not high in the warehouse due to the flow of goods all the time. In addition, the flow of products to customers also results in the company receiving the sales revenue. Therefore, it results in a higher number of inventory turnover rates as well.

Class B is the products that are in the warehouse before being delivered to customers in a certain period but not much time. Reasonable amount of Products in this category should therefore be kept in warehouse but it should not be too much because it will cause the expense on the storage.

Class C is the products that have the most time in the warehouse but a small amount of sales per year. There should be a new analysis and modernization continuously because the market demand for each product is uncertain. The up and down of the demand depend on many factors since most of the money lost is sunk cost.

By increasing efficiency, the researchers therefore measured the logistics performance which consisted of 3 dimensions: cost dimension, time dimension, and reliability dimension. After increasing the warehouse efficiency, it found that the original cost of 64,000 baht can be reduced to 40,000.312 baht per month. At the same time, the time of 1 hour and 30 minutes per cycle can be reduced to 1 hour per cycle. For the reliability, it found that employees within the warehouse originally pick up the product according to the target of 95 percent. After improving the location form and product placement, they pick up the product according to the target set, increasing to 98 percent.

**Figure 5**
Warehouse Layout after Improvement



## DISCUSSION

The efficiency enhancement of warehouse space management with ABC Analysis: A Case study ABC Company Limited is to develop the guidelines for inventory placement to facilitate the fast moving of products and able to effectively respond to related processes. The organization should be aware of the form of product layout and logistics management process within the warehouse. In addition, employees are an important part in driving the process within the warehouse. It is important that employees must have knowledge about Location and symbols on each product in order to speed up the activity within the warehouse. The research results correspond which found that employees who had different personal factors in terms of gender, age, education level, work experience, and job positions will be perceived in the use of the overall system within the warehouse differently [8]. Therefore, there is a need for training or teaching before starting the real work. The problems and obstacles in the operation arise from the environmental factors in the warehouse, such as the equipment in the warehouse is not enough to meet the demand. Consequently, workers in various parts In the warehouse should be manage the time in equipment usage appropriately during the rush time of each process.

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## REFERENCES

[1] Thaweesak Theppitak. (2007), Logistics management, warehouse management, inventory control, purchasing, production management. Bangkok: *Expernet*.
[2] Khumni Api Prichayanai. (2003), Logistics and Supply Chain Management of Strategy to Rich helps to save. Bangkok: *Nutporn Favtory*.
[3] Monthatipkul, C., and Yenradee, P., (2007). Positioning Safety Stock in a One-Warehouse Multi-Retailer Supply Chain Controlled by Optimal Inventory/Distribution Plan. International Journal of Industrial Engineering, 14(2), 169-178.
[4] Bunsap Panischayakarn. (2006), Logistics Management Leader. Bangkok: Intertransport Logistics.
[5] Y.Kohara, Five layer Why-why Analysis for IT projects, PROMAC, Chiba, Japan, 2010
[6] Ishikawa K, Loftus JH, (Eds) Introduction to quality control. Tokyo, Japan: 3A Corporation; 1990.
[7] Diana L., Francisco A., Soumaya Y. & Ada A. (2017). A multi-start algorithm to design a multi-class classifier for a multi-criteria ABC inventory classification problem. Expert systems with application, 81(1), 12-21.
[8] Varaporn Saninmool. (2014). The Study Readiness of Warehouse Staff Using Warehouse Management System Program. *Jornal of Logistics and Supply Chain College*. Nonthaburi: Buddy Creation Publishing, Thailand. Vol. 1, No. 2, Pp. 74-82.